ASI8921

MULTI CHANNEL TUNER ADAPTERS

1 DESCRIPTION

The ASI8921 series are professional PCI tuner adapters designed for use in AM/FM/RBDS/RDS radio broadcast audio monitoring and auditing.

The ASI8921 is based on tuner modules. Each module has four tuners on it and the ASI8921 can hold a maximum of two modules.

Up to eight different channels of AM or FM can be received and recorded simultaneously from a single antenna input. Recording formats include PCM and MPEG-1 layer2 and MPEG-1 Layer 3 (MP3).

2 ORDERING INFORMATION

ASI8921-1000	4 channels of AM/FM/RBDS/RDS
ASI8921-1100	8 channels of AM/FM/RBDS/RDS
ASI8921-2000	4 channels of AM/FM/RBDS/RDS + MCX external antenna jacks
ASI8921-2200	8 channels of AM/FM/RBDS/RDS + MCX external antenna jacks

3 FEATURES

- Up to 8 channels of AM/FM audio capture
- Up to 8 channels of FM RBDS/RDS data capture
- AM/FM/RBDS/RDS tuners can be fed from individual external antennae
- Audio monitoring of all tuners simultaneously
- MRX technology allows each stream to have an independent sample rate of between 8 and 48kHz
- PCM and MPEG-1 Layer 2 and MP3 recording formats
- Half-length PCI card
- Up to 8 cards in one system
- Windows XP/Server 2003/Vista and Linux software drivers available

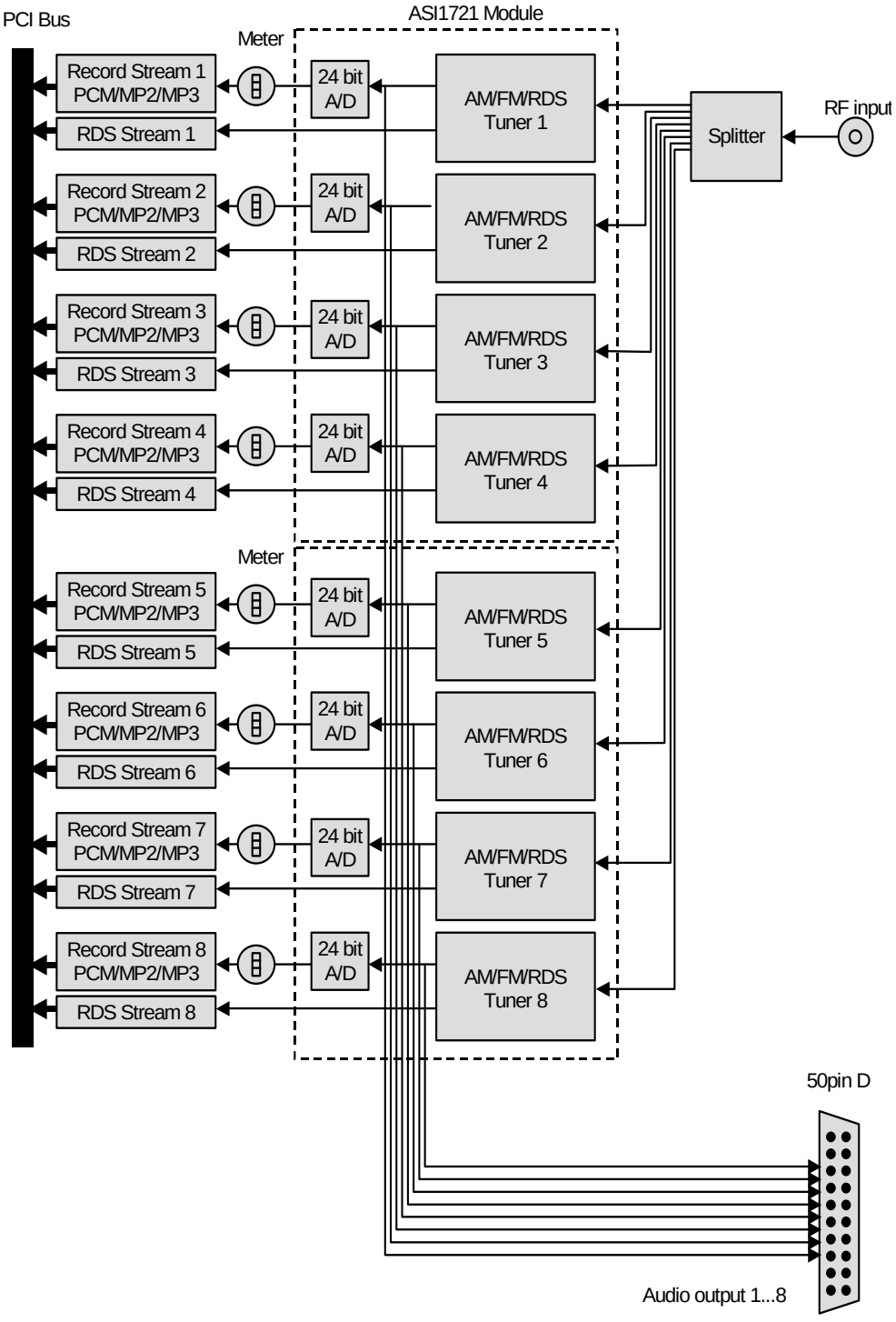
4 SPECIFICATIONS

RF INPUT		
Connector	F type 75 ohms, on card bracket MCX connector (optional) (AM/FM only, per tuner, jumper selectable)	
FM/RDS TUNER (-1000, -1100, -2000, -2200)		
FM		
Modes	Mono or Stereo	
Frequency range	75.9MHz - 108.1MHz , 50kHz channel spacing	
Sensitivity	15dBuV for 30dB THD+N	
Input Level	90 dBuV Maximum (F connector) 100 dBuV Maximum (External antenna connector)	
THD+N	55dB @ 60dBuV RF Level, 1kHz sinewave, mono, 75kHz deviation, A-weighting	
De-emphasis	50us or 75us (software selectable)	
Audio bandwidth	30Hz-15kHz (+/-3dB)	
RDS/RDBS		
Sensitivity	25 dBuV	
AM TUNER (-2000, -2200)		
AM		
Frequency range	520kHz-1720kHz, 1kHz channel spacing	
Sensitivity	30dBuV for 30dB S/N	
Input Level	F connector: External antenna MCX connector:	75 dBuV Maximum 90dBuV Maximum
THD+N	50dB @ 60dBuV RF Level, 1kHz sinewave, 75% modulation, A-weighting, 2kHz bandwidth	
De-emphasis	None or 50us (software selectable)	
Audio bandwidth	100Hz - 2kHz (+/-3dB)	
LINE OUTPUT		
Connector	Mini 50pin on card bracket	
Breakout Cable (included)	CBL3004 – Mini 50pin to 24 RCA jacks	
Audio	4Vpp max into 10Kohms	
Video	CVBS, 1Vpp into 75ohms	
SIGNAL PROCESSING		
DSP	Texas Instruments TMS320C6713@300MHz	
Memory	8MB	
Sample rates	8, 11.025, 12, 16, 22.05, 24, 32, 44.1, 48kHz	
Audio Formats	8 bit unsigned PCM, 16bit signed PCM, 24 bit signed PCM, 32bit IEEE floating point PCM, MPEG-1 Layer 2, MPEG-1 Layer 3 (MP3) (MPEG Layer-3 audio coding technology licensed from Fraunhofer IIS and THOMSON multimedia)	
GENERAL		
Bus	Universal 32bit PCI (3.3V or 5V signaling)	
Dimensions	PCI short-length form factor (6.6 inches/168mm long)	
Weight	7oz (200g) max	
Operating Temperature	0°C to 70°C	
Power Requirements	3.3V @ 1.3A, +5V @ 0.8A, -12V @0.1A	

5 CONTENTS

6 BLOCK DIAGRAMS

ASI8921 - 8 x AM/FM/RDS



7 CONNECTORS

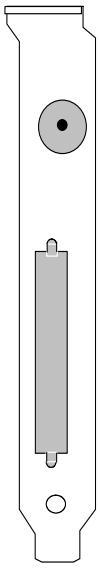
7.1 F-Type

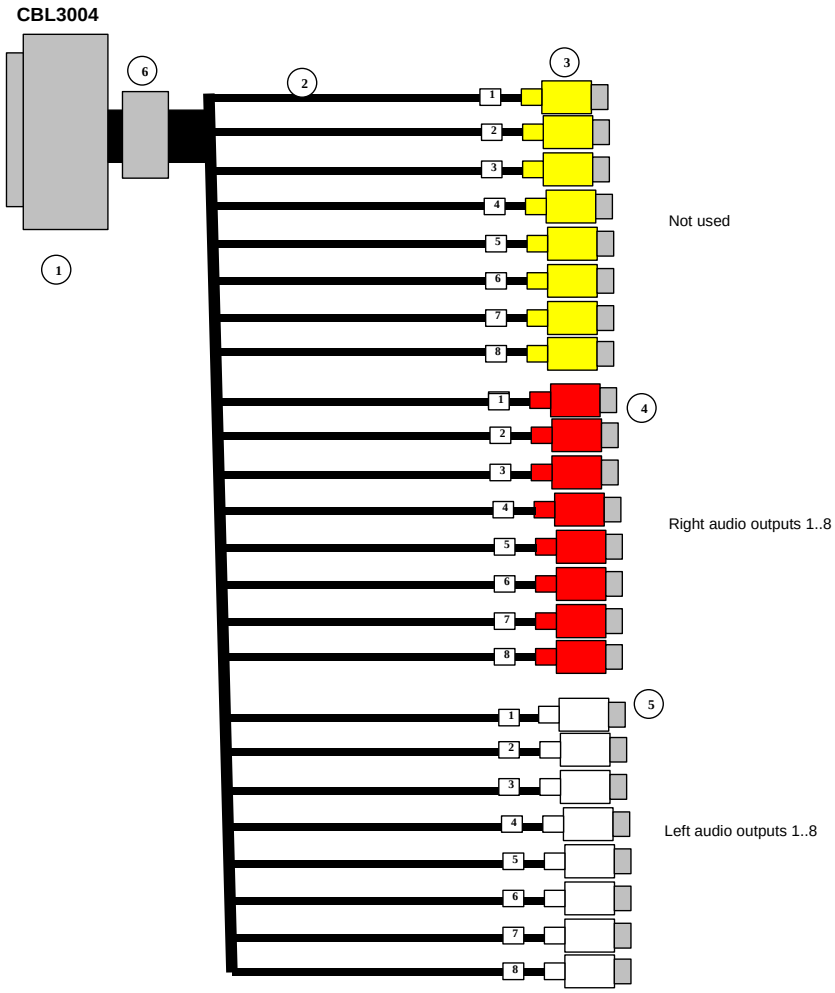
The F connector feeds the RF signal from an external antenna to all tuners on the ASI8921.

7.2 HD50

The HD50 connector makes available the mono or stereo audio of each tuner output. Ch1 is sourced from a software-controlled mux and may be programmed to output Ch1...8. The output level is 2Vpp into 10Kohms.

Breakout cable CBL3004 is supplied with the ASI8921. This supplies the 8 stereo audio outputs and 8 CVBS video outputs, all on RCA (phono) jacks.





8 Hardware Installation

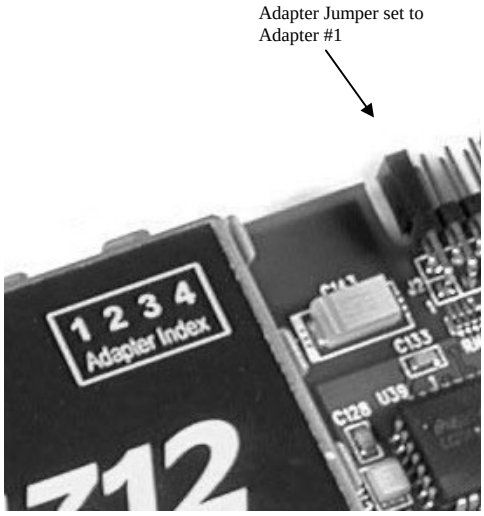
This section explains how to install one or more AudioScience adapters in a computer.

1. Make sure your computer is turned off.

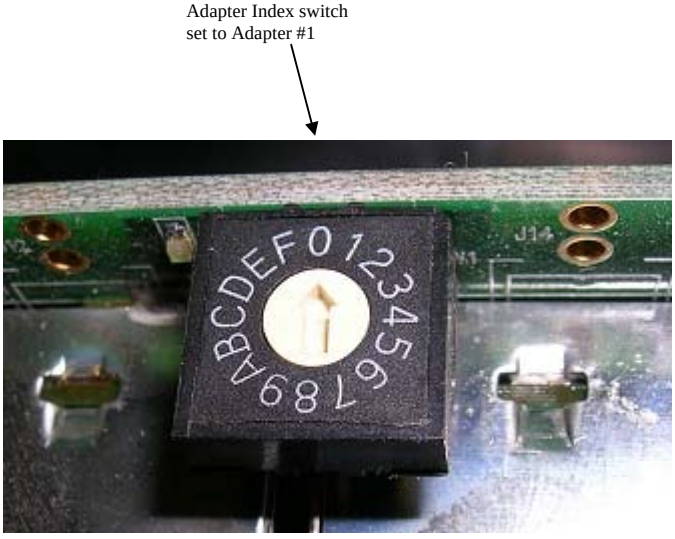
2.PCI adapters should be installed in any empty PCI slot and PCIe adapters should be installed in any x1 (or greater) PCIe slot.

3. Make sure the adapter jumper is set to adapter index #1 (factory default). Depending on the adapter family, there are different ways of setting the adapter index.

For ASI4000, ASI5000, ASI6000 families, there is an adapter jumper that must be set. The left most position represents adapter index #1.



For ASI8700 and ASI8900 families, there is a rotary switch. NOTE Position 0 (zero) represents adapter #1, position 1 is adapter #2, etc



4. When installing two or more adapters in the same computer, make sure they have the adapter jumper/rotary switch position set to unique numbers. For example if you are installing two adapters, the first one would be set to adapter index #1 and the second to adapter index #2.

Different adapter types can coexist in the same computer; for example, an ASI6416 and ASI8702 will work correctly if installed in the same PC. Different adapter types still require unique adapter index numbers.

5. Turn on the computer and let it boot. Under Windows 2000/XP a dialog box will pop up informing you that the computer has detected a new Multimedia Audio card. Cancel out of this dialog box and proceed to the software installation section of this datasheet.

9 SOFTWARE INSTALLATION

AudioScience makes audio adapters and drivers for various operating systems. Enhancements to an adapter's utility come from the integrators software that uses the audio driver to implement sophisticated audio playback and recording functions.

9.1 Drivers for Windows 2000/XP/Server 2003/Vista

The first step is what type of driver is needed for the adapter. There are two types of drivers for Windows: The WAVE driver and the WDM driver. Typically this will be decided by the application used with the AudioScience adapter. For any application that uses DirectSound, use the WDM driver.

Driver 3.10 and later present the user with three install options during installation:

- Install Standard PCI/PCIe Driver.
- Install Standard + Network Audio Driver.
- Remove all driver components

Traditional installs should select the first of these options. Users of AudioScience CobraNet products should select the second option with the "+Network Audio Driver." in the text.

9.1.1 WAVE Driver

Download the file named ASIWAVE_xxxxxx.EXE from www.audioscience.com and run it (_xxxxxx is the version number). After the EXE has run, reboot the computer and the audio adapter will be operational. If the cover is off the computer, one can see one or two blinking LEDs on top of the card indicating its DSP is running and communicating with the driver.

Verify that the adapter is running using ASIControl (see ASIControl section in this document).

9.1.2 WDM Driver

Download the file named ASIWDM_xxxxxx.EXE from www.audioscience.com and run it (_xxxxxx is the version number). After the EXE has run, reboot the computer and the audio adapter will be operational. If the cover is off the computer, one can see one or two blinking LEDs on top of the card indicating its DSP is running and communicating with the driver.

Verify that the adapter is running using ASIControl (see ASIControl section in this document).

9.1.3 Combo Driver

The Combo driver presents both Wave and WDM devices to the user. Download the file named ASICOMBOV_xxxxxx.EXE from www.audioscience.com and run it (_xxxxxx is the version number). After the EXE has run, reboot your computer and the audio adapter will be operational. If the cover is off the computer, one can see one or two blinking LEDs on top of the card indicating its DSP is running and communicating with the driver.

Verify that the adapter is running using ASIControl (see ASIControl section in this document).

9.1.4 ASIO

The AudioScience drivers listed above also install an ASIO driver interface. It is installed by default.

9.2 Driver Failure

In the event that an adapter's driver fails to load correctly, the OS's event viewer should be checked. The event log is viewed as follows:

XP: The system event log is accessed from \Start\Control Panel\Administrative Tools\Event Viewer. The System view should be selected.

Vista: The system event log is accessed from \Start\Control Panel\System and Maintenance\Administrative Tools\Event Viewer. The Windows Logs\System view should be selected.

If two or more adapters are installed in the same system, the first thing to check is that the adapters were assigned unique adapter numbers. If issues persist, please email support@audioscience.com.

9.3 Drivers for Linux

The latest Linux driver can be downloaded from the AudioScience website – www.audioscience.com

9.4 Applications for Windows

AudioScience provides two application for adapter set-up and configuration: ASIControl and ASIMixer.

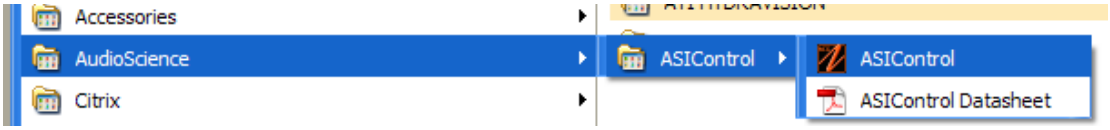
9.4.1 ASIControl

All Windows drivers install an AudioScience application called ASIControl that can be used to setup and verify functionality of adapters. ASIControl provides a common interface for users across all driver types.

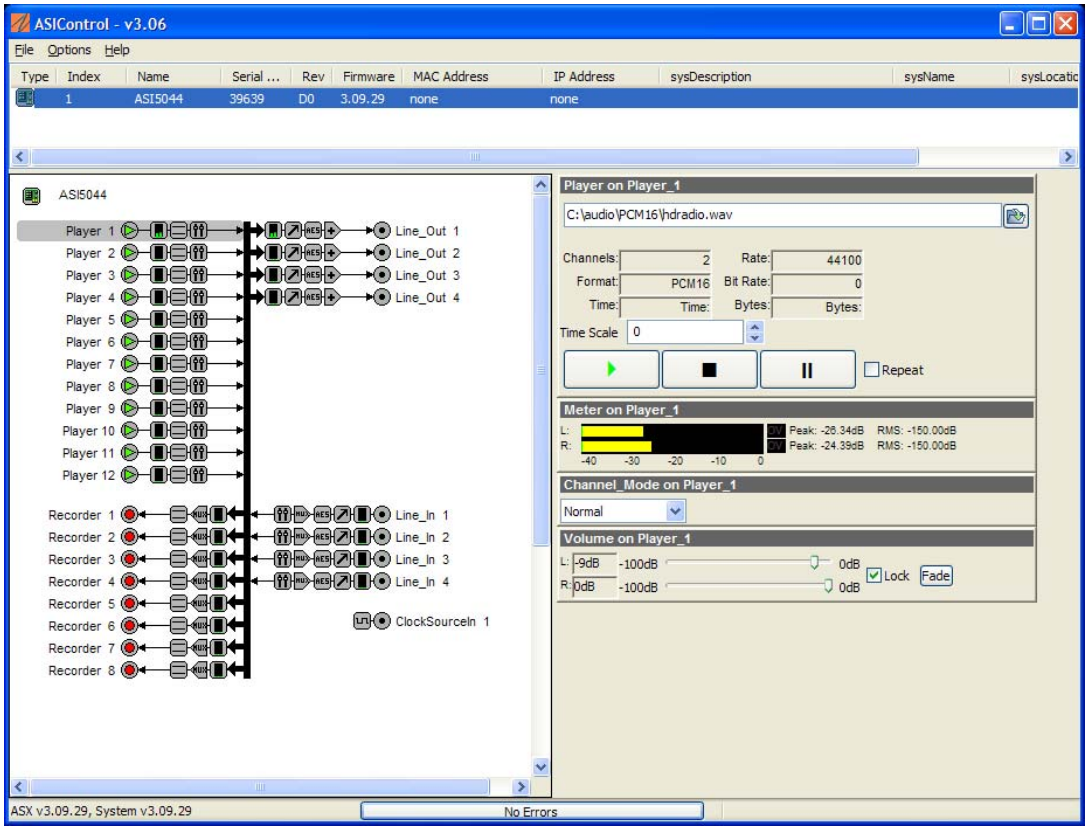
The following list of controls are uniquely supported in ASIControl (as opposed to ASIMixer):

- ASI8700 tuner pre-emphasis
- ASI8900 tuner RDS
- ASI8900 tuner FM stereo indication
- ASI8914 HD Radio PAD field
- ASI8914 HD Radio Digital status field
- ASI8914 HD Radio Digital program number selection

From the Windows Start menu, navigate to Start→Programs→AudioScience and run the ASIControl program.



When started, ASIControl will look something like the following:

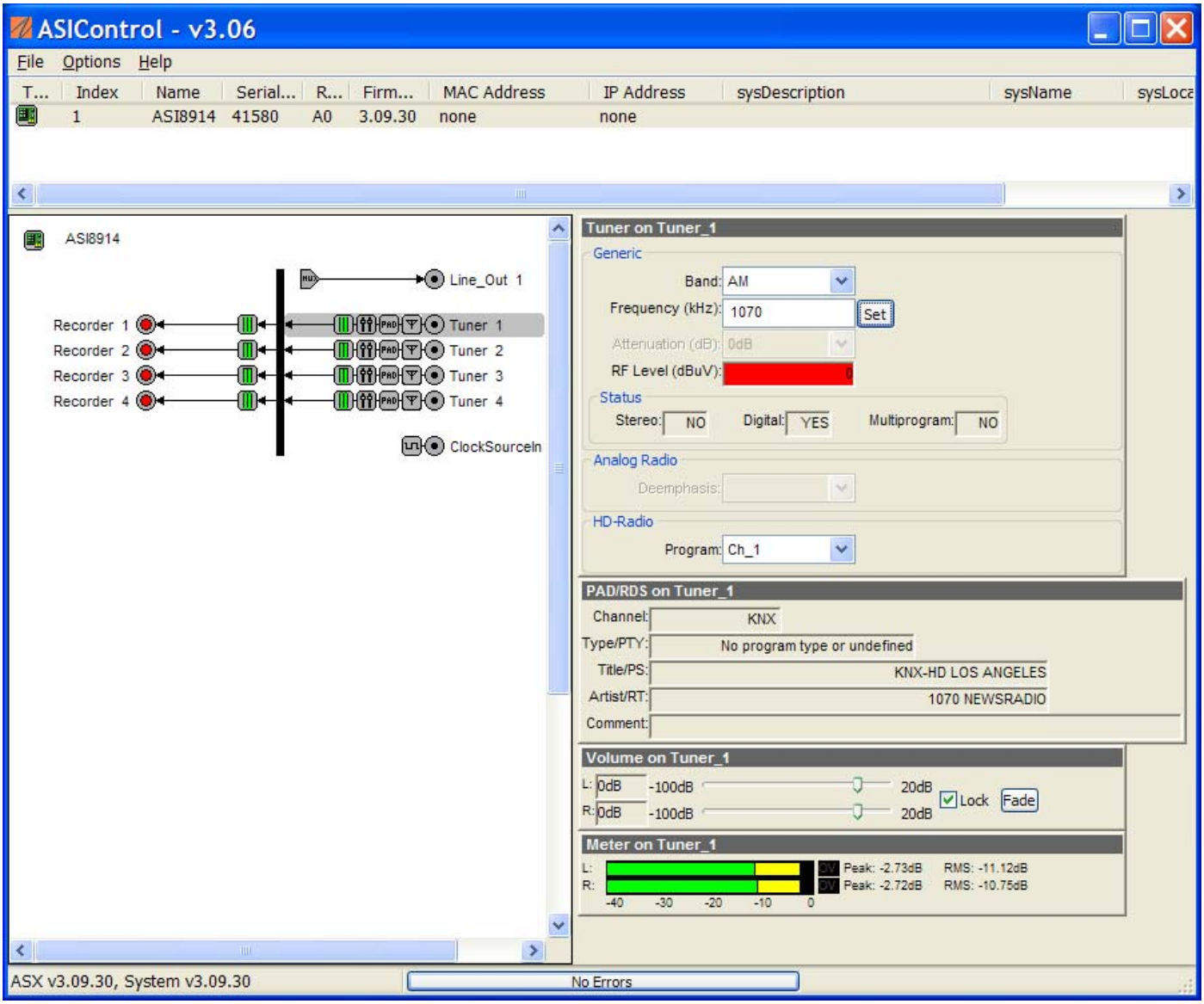


9.4.2 ASIMixer

ASIMixer is specific to the Wave and Combo drivers and is available from the AudioScience website. It uses the Wave/Mixer interface to control AudioScience adapters. Users of driver version 3.10 and later are encouraged to use ASIControl for manipulating adapter controls.

See the list of controls in the previous section that that are only available in ASIControl.

10 OPERATION USING ASICONTROL



For more information on how to operate ASIControl, please see the ASIControl datasheet, available from www.audioscience.com and also installed by the driver.

11 AUDIO FORMATS

The ASI8921 supports the following audio recording formats:

Format	HPI format	Windows format
8 bit unsigned PCM	HPI_FORMAT_PCM8_UNSIGNED	WAVE_FORMAT_PCM, wBitsPerSample=8
16 bit signed PCM	HPI_FORMAT_PCM16_SIGNED	WAVE_FORMAT_PCM, wBitsPerSample=16
32 bit floating point PCM (+/-1.0)	HPI_FORMAT_PCM32_FLOAT	WAVE_FORMAT_IEEE_FLOAT
MPEG-1 Layer 2	HPI_FORMAT_MPEG_L2	WAVE_FORMAT_MPEG -fwHeadLayer=ACM_MPEG_LAYER2 -fwHeadMode=ACM_MPEG_SINGLECHANNEL, ACM_MPEG_DUALCHANNEL, ACM_MPEG_STEREO
MPEG-1 Layer 3 (MP3)	HPI_FORMAT_MPEG_L3	WAVE_FORMAT_MPEG - fwHeadLayer=ACM_MPEG_LAYER3 -fwHeadMode=ACM_MPEG_SINGLECHANNEL, ACM_MPEG_DUALCHANNEL, ACM_MPEG_STEREO OR WAVE_FORMAT_MPEGLAYER3

Not all combinations of channels, samplerates and bitrates are allowed for MP3. The following table shows the supported variations, assuming all eight recording streams are being used:

Sample Rate (kHz)	Channels	Bitrates (kbs)
8, 11.025, 12	Mono/Stereo	16,32,40,48,56
16, 22.05, 24	Mono/Stereo	16,32,40,48,56,64,96,112,128
32	Mono only	32,40,48,56,64,80,96,112,128

NOTE – for maximum efficiency, you must use one sample rate for all streams and set the global sample rate of the ASI8921 to this rate.

12 ANTENNAS

12.1 Antennas

AudioScience has tested and can recommend the following antenna configuration for use with the ASI8700 and ASI8900 series adapters.

The configuration is made up of an omni-directional FM whip antenna, plus multiple ferrite stick antennas, each oriented and tuned to pick up a particular AM station. The antenna's signals are mixed using a common 75-ohm cable TV splitter, which we have found has the necessary low end bandwidth to pass AM signals.

The FM antenna is made by Fanfare (http://www.fanfarefm.com) and is part number FM-2G. Besides FM stations, this antenna will also pick up strong AM stations.

The AM antenna is made by C.Crane (http://www.ccrane.com) and is part number TCA. This antenna has a tuning control that allows you to tune into a particular station using a dial on the front of the control.

The following diagram shows how three AM and the one FM antennas would be wired.

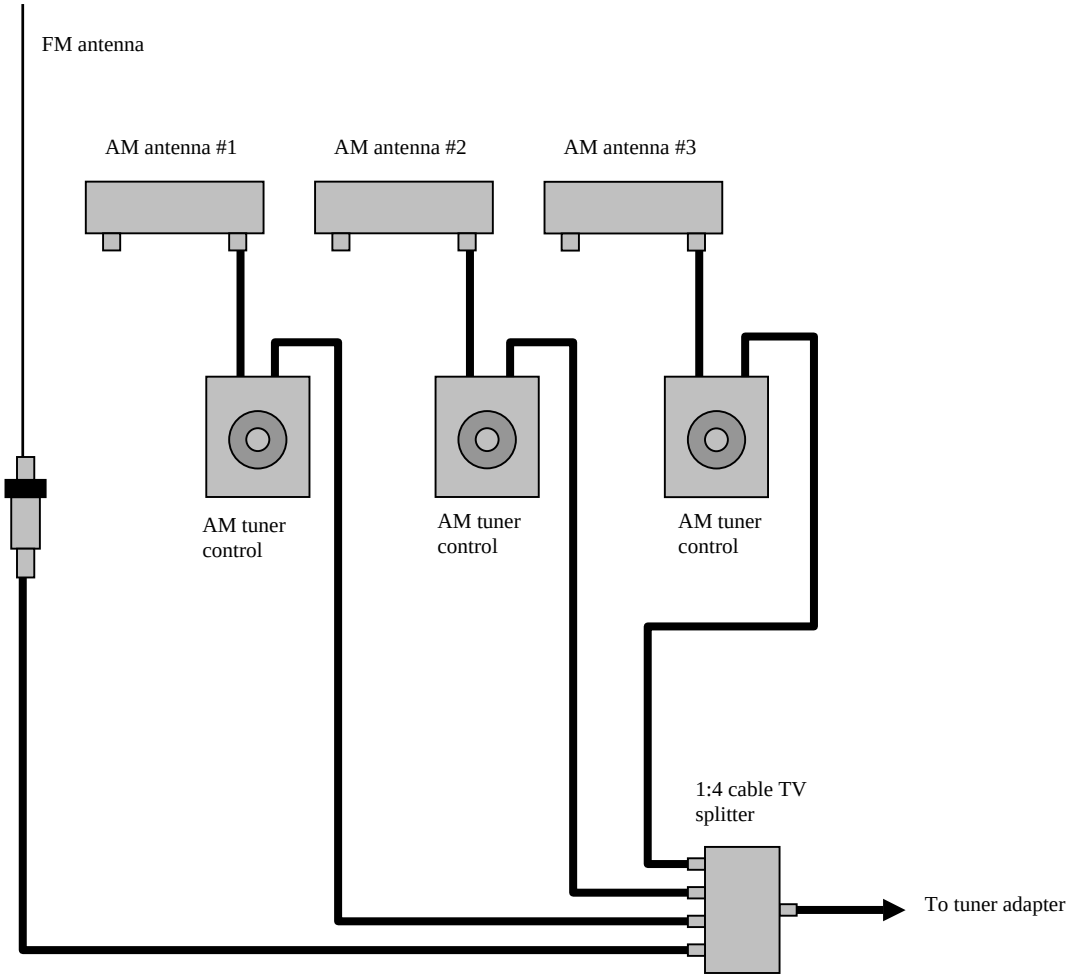
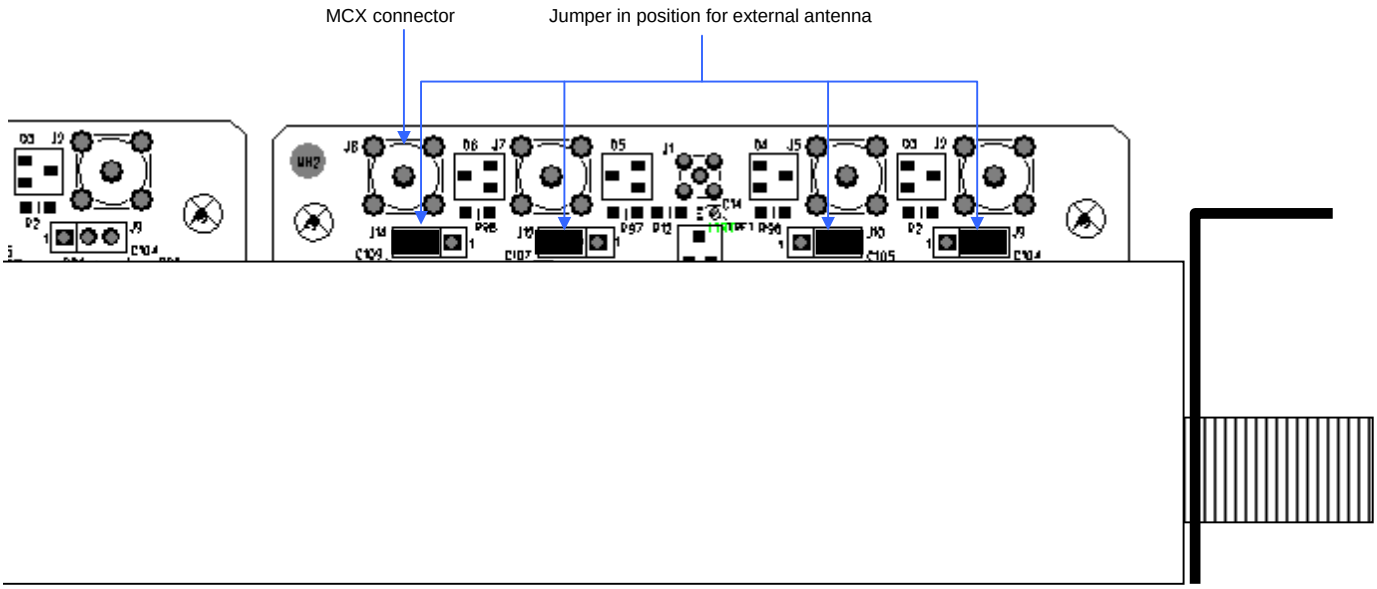


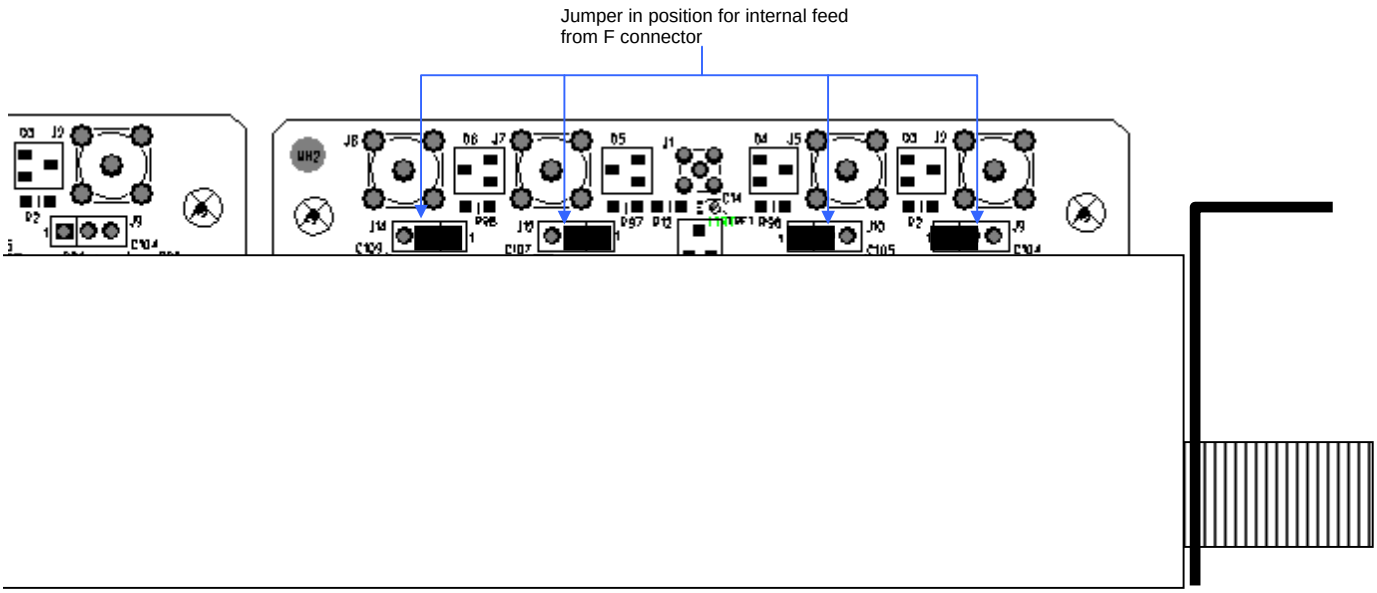
Figure 1. Four antennas, three AM and one FM, wired together.

12.2 Per-Tuner External Antennas

The ASI8921 allows each tuner to be connected to an individual external antenna rather than being fed from the F connector on the bracket. This is accomplished by jumpering the appropriate tuner to use the MCX jack as an RF signal input. MCX jacks are only available on ASI8921-2000 and –2200 models.

The picture below shows the jumper positions for the external antenna for one of the two modules. The second module is the same





NOTE: There is no amplification of the RF signal when using the antenna via the MCX jack so the received signal strength (RF level) may be lower than when using the internal signal feed from the F connector.

AudioScience has available a cable (Part # CBL3001) that connects to the MCX jack and provides an F connector on the other end.

13 ERRATA

This section lists known issues for specific hardware revisions.

Rev E0 - none

Rev D0 - Tuner 5 through 8 right channel is not present on the mini DB-50 connector

14 REFERENCES

14.1 RDS

Wright, Scott, 1997, "The broadcaster's guide to RDS", ISBN 0-240-80278-0

14.2 Specifications

SPCHPI.PDF - Hardware Programming Interface (HPI) Specification

SPCWAVX.PDF - WavX - AudioScience Windows Multimedia Extensions

These documents are available from www.audioscience.com in the Technical Info section.

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